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The Locust Borer

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The locust borer, *Megacyllene robiniae* (Forst.), is a native insect discovered in 1702 and named *Cyllene robiniae* in 1771 by Forster, an English entomologist. Its original range probably coincided with that of its host tree the black locust (*Robinia pseudoacacia* L.): along the Allegheny Mountains from Pennsylvania to Georgia and in the Ozark Mountain Region. The widespread use of black locust as a shade tree and, more recently, its extensive use in reforestation and land-reclamation plantings have enabled the borer to disperse generally with its host over most of the United States. It may now be found from eastern Canada south to the Gulf States and westward to Washington, Colorado, and Arizona.

Many of the trees used in reforestation and land reclamation have been planted in soils badly eroded by wind or water and severely depleted of soil nutrients by poor farming practices. Such plantings provide an ideal environment for the locust borer and pave the way for subsequent serious damage.

Injury

Borer larvae tunnel into and through the trunk and limbs of an infested tree, physically weakening it and making it susceptible to wind breakage (fig. 1). Repeated attacks often result in the production of nothing more than sprout growth (fig. 2).

The most obvious signs of severe borer attack in a stand of black locust are the numerous dead and broken limbs. Closer inspection reveals knotty swellings on the trunks. Indications of live borers within the tree vary with the season. Wet spots on the bark in early spring when the buds swell mark the activity of young larvae in the inner bark (fig. 3). In late spring or early summer the developing larvae work into the sapwood and push white wood dust from their tunnels. When the larvae burrow more deeply and reach the heartwood in late summer, the wood dust becomes yellow. Wood dust may accumulate in a ring around the base of a heavily infested tree.

The degree of damage varies in different locations according to tree vigor and the influence of environmental factors such as light, temperature, drought, fire, grazing, and pruning. As the vigor of the tree increases, the borer damage decreases; within locust stands older than 10 years, the thrifty dominant trees are able to overcome attack; but the slowly growing overtopped trees are badly damaged or killed.

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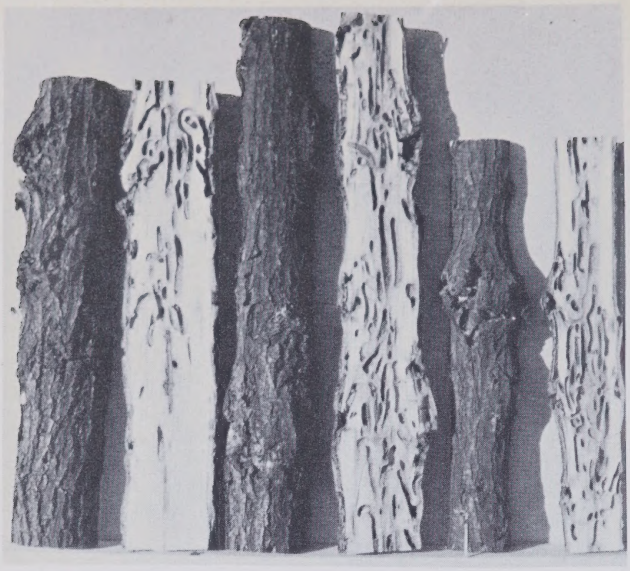

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FIGURE 1.—Internal damage to black locust and external appearance.

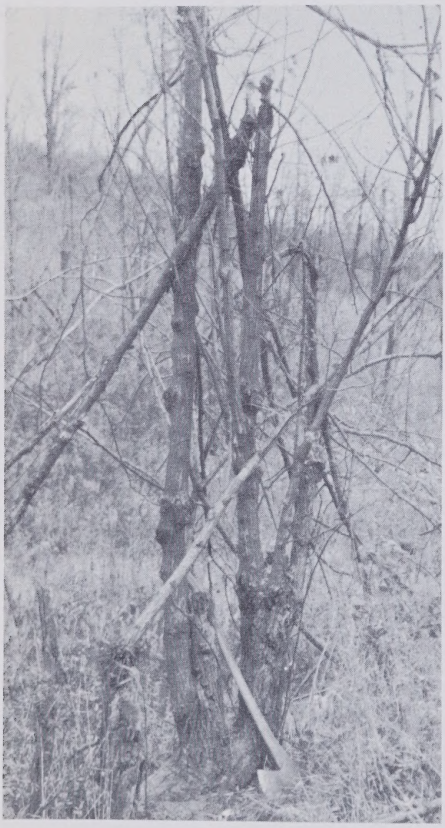

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FIGURE 2.—Black locust restricted to shrub form by repeated attack of the borer.

Light and temperature influence attack by their effects on the female beetles. For example, when the air is warmer than 75° F., the shaded parts of tree trunks are preferred for egg laying; whereas, at temperatures below 70° F., trunks receiving full sunlight are preferred. Thus, when the weather is cool during the egg-laying season, fewer eggs are laid in densely shaded stands of locust than in those more exposed to light. Conversely, when the weather is warm during this period, more eggs are laid on trees growing in the shade.

Although black locust is a shallow-rooted species, it will grow on poor sites. Trees growing on such sites are subject to serious damage during periods of prolonged drought. Drought-weakened trees are especially susceptible to borer attack.

Trees in stands that have been burned over are especially susceptible to borer damage. This is because of decreased vigor, either

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FIGURE 3.—Black locust with bark removed in early spring. Dead tissue scars are points of attack by young larvae.

directly by damage to the thin bark of young trees or indirectly through destruction of leaf mold and litter.

Grazing of livestock can also contribute to borer damage in black locust. In addition to weakening the tree by feeding on foliage and young succulent growth and bark, cattle reduce site quality and tree vigor by compacting the soil.

Pruning creates abnormally favorable conditions for egg laying: crevices around wounds and callous tissue are ideal for oviposition.

Bark thickness is reported to be related to borer damage. Old trees with coarse thick bark are not damaged as much as thin-barked young trees. However, the branches of older trees are often infested (fig. 4).

Certain strains of black locust are inherently resistant to attack by the locust borer. Almost totally unsuccessful was an attempt to rear adults from larvae placed on trees of a strain known as "Higbee." The locust borer is not known to attack any of the nine other species that occur within the genus *Robiniae*, nor does it damage honeylocust (*Gleditsia triacanthos* L.).

Description

The adult locust borer is a slender "long-horned" beetle about three-fourths of an inch long. The jet-black background color is marked with bright yellow bands, one of which is W-shaped, that extend across the thorax and elytra. Legs and antennae are yellow. Males and females are similar in appearance.

The mature larva is white and about 1 inch long and ¼ inch in diameter. The freshly formed

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FIGURE 4.—Mature black locust on an old farm lane. Borers were found only in limbs from 1½ to 4 inches in diameter.

pupa is creamy white and about ¾ inch long. Since the larval and pupal stages are spent within the tree, they are not seen by the casual observer (fig. 5).

Seasonal History

The adult is the most conspicuous form of the locust borer. Adults first appear when the goldenrod is in bloom, and are most abundant during September when they are commonly found feeding on pollen of goldenrod blossoms during the mornings. The females prefer to lay their eggs in rough bark crevices and around wounds on the trunks of black locust (fig. 6). Oviposition is done in September and early October, mostly during the afternoons, but occasionally until late in the evening. Some adults may still be seen in late October.

The eggs are white ovals about 1/32 inch wide and 3/32 inch long. They are laid singly but prolifically in small areas. The eggs hatch in about a week, and the small white larvae bore into the inner bark. Each larva makes a small hiberna-

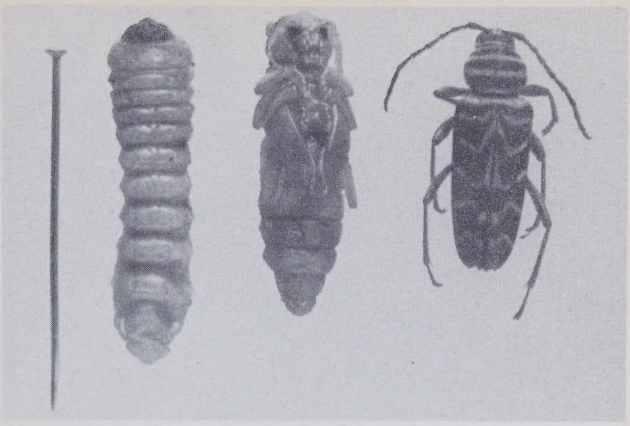

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FIGURE 5.—Late life stages of the locust borer: Mature larva, pupa, and adult beetle. (Pin shows relative size.)

tion cell and rests there over the winter. Activity is resumed in the spring at the time the leaf buds begin to swell. Oozing sap may then be seen around small holes in the trunk. The larvae soon bore into the woody part of the tree. The excavated galleries are enlarged through the spring and early summer months until they are 3 to 4 inches long and about ¼ inch in diameter. During this time the larvae grow to full size.

By mid-July most of them have matured and transformed into the pupal stage, which is completed between the end of July and the first 2 weeks of August. As the larva increases in size, it enlarges its tunnel to the exterior. The mature beetle emerges through this opening.

The timing of these life history events varies in different parts of the country according to differences in climate.

Prevention of Attack

Black locust shade or lawn trees can be protected from borers by spraying the trunk and limbs with a DDT emulsion. To prepare small amounts of this spray, use 2½ tablespoons of a 25-percent DDT concentrate per gallon of water. For larger amounts, add 1 gallon of the concentrate to 99 gallons of water. Apply two or three times at 2-week intervals beginning about the time goldenrod comes into bloom. This is a preventive measure aimed at killing the adults while they travel up and down the tree, as well as the larvae hatching from eggs laid on the bark.

A common method of controlling larvae in specimen trees in the spring consists of squirting carbon tetrachloride into the borer holes and then plugging them with putty or wet clay. Another measure consists of spraying the wet spots on infested trees early in the spring with orthodichlorobenzene emulsion. This can be prepared by diluting one part of stock emulsion with two parts of water. The stock itself is prepared by dissolving one pound of fish oil or common laundry soap in a gallon of boiling water. After cooling, add one gallon of the orthodichlorobenzene and thoroughly mix. These measures are too expensive for forest tree protection.

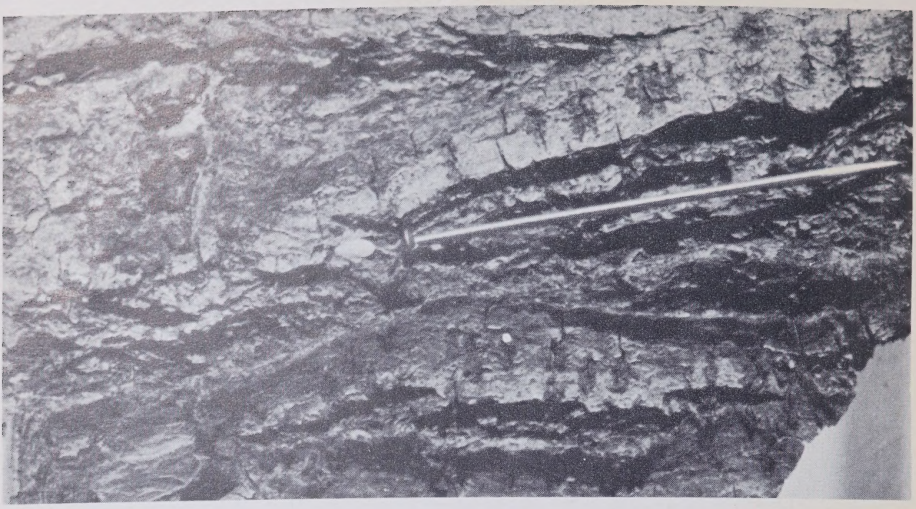

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FIGURE 6.—Locust borer egg on bark. (Pin shows relative size.)

Silvicultural methods should be used for control of the locust borer in forested areas. These methods consist of clear cutting (to produce vigorous sprout growth), thinning, mulching, the use of mixed tree species in plantings, or the planting of superior varieties of black locust. The method chosen is determined by the age, amount of borer injury, or composition of the stand.

Slow-growing young stands are very susceptible to borer attack. To circumvent damage by the insect, these stands can be cut back before borers attack them. The vigorous sprouts that follow will generally be less subject to attack.

Severely injured stands can be improved by clear cutting them during the dormant period and allowing them to regenerate from sprouts. The sprouts that follow should be thinned by removing all but the most vigorous in each group. This procedure has resulted in a good second crop of trees with very light subsequent injury.

Moderately to lightly injured stands on medium to good sites also benefit from thinning. In such stands, injury is mainly confined to overtopped, intermediate, or decadent trees. Removal of these trees should reduce the borer population and thereby help to protect the more desirable trees.

Borer injury is usually less when black locust is grown in mixture with other tree species, than when grown in pure stands. Mixed stands usually produce denser shade and more leaf litter than do pure stands of locust. The trees are more vigorous when nutrients from decomposed leaf litter are available. Thus, the addition of several inches of hardwood leaves in pure locust stands results in accelerated growth in height and diameter for several years after the treatment and should reduce chances of serious borer damage.

Old black locust trees with stag-headed tops serve as brood trees for the borer. Removal of these trees

from the vicinity of planting areas should be helpful in reducing damage to the young planted trees. These large brood trees should be cut during the dormant period and either peeled or burned so as to destroy the borer larvae.

Caution: Insecticides are poisonous and should be used with due precaution and according to recommendations of the manufacturer. They should be stored in a safe place, properly labeled, and away from food.

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